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IS 13130-1 (1991): Wrist watches and watch movements, Part 1: Mechanical watches [PGD 23: Horology]

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भाग 1 यांत्रिक घड़ियाँ

Indian Standard

WRIST WATCHES AND WATCH MOVEMENTS — SPECIFICATION

PART 1 MECHANICAL WATCHES

UDC 681·114·8·031·11 : 006·354

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

September 1991 **Price Group 2**

Horology Sectional Committee, LMD 23

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Horology Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

This standard is being issued in two parts. The other part is: Part 2 Quartzs electronic watches/ movements. In the formulation of this standard assistance has been derived from the following publications:

a) Japan Export Inspection Standard — published in 1981.

b) Federal Decree on the Official Quality Control in the Swiss Horology Industry Doc No. 934, 11 of March 18, 1971.

c) DIN 8312 Tail 1.

Indian Standard

WRIST WATCHES AND WATCH MOVEMENTS — SPECIFICATION

PART 1 MECHANICAL WATCHES

1 SCOPE

This standard (Part 1) covers the performance and reliability requirements and method of tests for watches/watch movements of mechanical type.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
9243 (Part 1) : 1987	Method of test for wrist watches: Part 1 Antimagnetic (*first revision*)
9243 (Part 2) : 1987	Method of test for wrist watches: Part 2 Shock resistance (*first revision*)
9243 (Part 3) : 1987	Method of test for wrist watches: Part 3 Water resistant (*first revision*)
9261 : 1979	Symbolization of control positions for time-keeping instruments
9263 (Part 1) : 1979	Horological jewels: Part 1 Functional and non-functional jewels (definition)
9275 : 1979	Requirements for radio-luminescence for time keeping instruments
9672 : 1980	Dimensions for movements for wrist watches
11681 : 1986	Technico commercial definitions of horological vocabulary

3 DEFINITIONS

For the purpose of this standard the definitions given in IS 11681 : 1986 and the following shall apply.

3.1 Isochronism Error

Expression of the difference between the instantaneous rates (in s/day) at full winding and 24 hours after full winding in the same positions.

3.2 Position Error

Expression of the difference of instantaneous rates in (s/day) between any two positions at full winding.

3.3 Thermic Coefficient

Expression given by the variation of instantaneous rate of a watch when temperature rises or falls by 1°C.

3.4 Position Symbols

Symbols for indicating different positions in which time-keeping instruments are placed for testing and control purposes shall be as given in IS 9261 : 1979.

4 CLASSIFICATION OF WATCH MOVEMENTS

Classification of watch movements shall be as given below:

Type of Movement	**Round**	**Shaped**
Criteria	Fitting dia d in mm	Fitting area 'A' $l_1 \times b_1$ in mm^2
Clarification		
L (Large)	$d_1 > 20$	$A > 314$
B (Big)	$16 < d_1 \leqslant 20$	$201 < A \leqslant 314$
S (Small)	$d_1 \leqslant 16$	$A \leqslant 201$

d and $l_1 \times b_1$ as defined in IS 9672 : 1980.

5 GENERAL REQUIREMENTS

5.1 Watches shall have a fine finish and shall be free from stains, peeled planting and corrosion. Any conspicuous flaws or any other noticeable defects shall not be visible when examined from a distance of 25 cm without using magnifying glass.

5.2 In watches/movements with the indication of the number of jewels, the actual number of functional jewels [as defined in IS 9263 (Part 1) : 1979] used in the movement shall be exactly the same as the number indicated.

5.3 Functions

5.3.1 Pulling-out and pushing-in of crown shall be certain and the action of push buttons, if any, shall be smooth.

5.3.2 Winding and hand setting shall be smooth and free from any fear of loosening or damaging other parts.

5.3.3 The change over of the calendar hand/disc, if any, shall be certain, and shall take place within ±60 minutes of the appointed time.

5.3.4 Other auxiliary mechanisms, if any, shall function properly.

6 PERFORMANCE REQUIREMENTS

6.1 Rundown Time

The watches/watch movements shall run down for a minimum period of 36 hours in the dial up (DU) position, after winding as specified in **6.1.1** and **6.1.2**.

6.1.1 In case of mechanical hand wound watch, the main spring shall be wound fully by manually winding it.

6.1.2 In case of self winding or automatic mechanical watches, the winding shall be done through the usage of an equipment known as 'Regulomat' (*see* **8.4**) for a period not more than 90 minutes.

6.2 Instantaneous rate, amplitude, isochronism error, position error, and thermic coefficient shall comply with the requirements given in Table 1, when the watch/movement is tested as per 7.

Table 1 Performance Requirements

Movement Classification (as per **4.1**) Requirements		*L*	*B*	*S*
Instantaneous Rate (s/day)	T_1 and T_3	+70 −25	+90 −30	+110 −30
Minimum Amplitude in degrees	a	150	135	135
Minimum Isocronism Error (s/day)	I *Max*	60	100	130
Maximum Position Error (s/day)	P *Max*	40	70	110
Maximum Thermic Coefficient (s/day)	C	3	4	4

where

T_1 and T_3 = instantaneous rates in DU and 6U positions as per **7.1**;

a = as per **7.2.1**;

I max = maximum value amongst ($T_1 - T_5$), ($T_2 - T_6$), ($T_3 - T_7$) and ($T_4 - T_8$) where T_1, T_2, T_3......T_8 are as per **7.1** and **7.2**;

P max = difference between the maximum and the minimum amongst T_1, T_2, T_3 and T_4, where T_1, T_2, T_3 and T_4 as per **7.1**; and

C = as per **7.5**.

7 TEST PROCEDURE

7.1 The instantaneous rate shall be measured at temperature for at least 30 seconds, in the positions DU, 9U, 6U and 3U between the 10 and 60 minute after full winding. The measured values are designated as below:

Test Position	**DU**	**9U**	**6U**	**3U**
Instantaneous Rate (s/day)	T_1	T_2	T_3	T_4

7.2 The instantaneous rate shall be measured for at least 30 seconds, in the positions DU, 9U, 6U and 3U, between 24 and 25 hours after full winding. The measured valued are designated as below:

Test Position	**DU**	**9U**	**6U**	**3U**
Instantaneous Rate (s/day)	T_5	T_6	T_7	T_8

7.2.1 The amplitude 'a', in degrees, is measured in 6U position between 24 and 25 hours after full winding.

7.3 The instantaneous rate shall be measured at a temperature of 23 ± 1°C, for at least 30 seconds, in the position 6U between the 10 and 60 minute after full winding.

The measured value is designated as T_9.

7.4 After taking the measurement as in **7.3**, the watch/movement is allowed to function for 2 hours at a temperature of 38 ± 1°C. Within the next 30 minutes, the instantaneous rate shall be measured for at least 30 seconds, the position 6U while the watch/movement is maintained at the same temperature. The measured value is designated as T_{10}.

7.5 Thermic Coefficient (C) (s/day/°C)

$$= \frac{T_9 - T_{10}}{38 - 23}$$

Where

T_9 and T_{10} are as per **7.3** and **7.4**.

8 TESTING EQUIPMENT

8.1 Environmental Chambers

To maintain the watch/movement at the required temperature.

8.2 Timing Machine

To measure the instantaneous rate in s/day.

8.3 Amplimeter

To measure the amplitude of the balance wheel, in degrees.

8.4 Regulomat

An equipment to mind self winding/automatic winding watches through simulating epicycloidal movements similar to the actions of wrist and arm. The hub carrying the arms (on which the watches/watch movements are fixed) should rotate as the rate of 1·5 rpm (approx), and for one revolution of the hub, each individual arm should make 5 revolutions around its axis.

9 RELIABILITY

9.1 Antimagnetic

9.1.1 A watch bearing the mark 'antimagnetic', shall comply with the requirements specified in IS 9243 (Part 1) : 1987.

9.1.2 A watch not bearing the mark 'antimagnetic', shall be tested as per **3.3.2** of IS 9243 (Part 1) : 1987, but with the intensity of magnetic field being 20 oe ol 1600 A/m. instead of 60 oe or 4800 A/m., and shall comply with the minimum requirements specified in **4** of IS 9243 (Part 1) : 1987.

NOTE — 1 oe = 80 A/m.

9.2 Shock Resistance

9.2.1 A watch bearing the mark 'shock resistant' shall comply with the requirements specified in IS 9243 (Part 2) : 1987.

9.2.2 A watch not bearing the mark 'shock resistant' shall be tested as per **A-1.1** of IS 9243 (Part 2) : 1987, but with the value of velocity 'V' being 2·215 m/sec instead of 4·43 m/sec, and shall comply with the minimum requirements specified in **4** of IS 9243 (Part 2) : 1987.

9.3 Water Resistance

A watch bearing the mark 'water resistant', shall comply with the requirements specified in IS 9243 (Part 3) : 1987.

9.4 Radiation Protection

A watch having radioluminescent material on its dial and hands, shall comply with the requirements specified in IS 9275 : 1979.

10 PACKING

The watches/watch movements shall be packed in such a way that the watches/watch movements shall not get damaged nor the performance/reliability criterias get affected due to the shocks and weather conditions during transit or storage.

11 MARKING

11.1 Watches/movements may be marked 'antimagnetic'/'shock resistant'/'water resistant', wherever applicable.

11.2 Each watch shall be marked with indication of source of manufacture.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.